

# NETRS232 Series

## Quick Installation & Advanced Features Guide

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# 1

## Getting Started

Congratulations on your purchase of a StarTech NETRS232. NETRS232s connect serial devices to Ethernet networks. Any serial device—POS equipment, factory machinery, monitoring hardware, or security devices, for example—can send its information to the NETRS232. The NETRS232 places the serial data in a TCP/IP wrapper and sends it out its Ethernet port. Data moving the other direction, from the Ethernet side of the NETRS232 to the serial device, undergoes the same process in reverse. StarTech NETRS232s use industry-standard hardware interfaces and are supported in Windows® 2000, Windows® XP, Linux, and QNX.

With a NETRS232, you can:

- Network serial devices
- Make devices available to multiple users
- Manage multiple serial devices from a single PC
- Eliminate long dedicated serial runs
- Stop using costly PCs as dedicated serial port servers
- Remotely access and control serial devices
- Eliminate long-distance phone-modem charges

Included with your package, you should have the following:

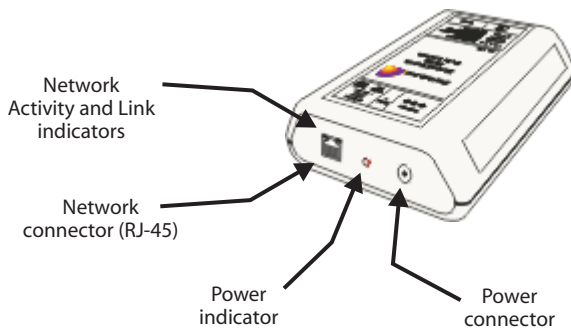
- StarTech NETRS232
- Power supply
- Installation diskette
- Quick Installation Guide

## 2

## Hardware Setup

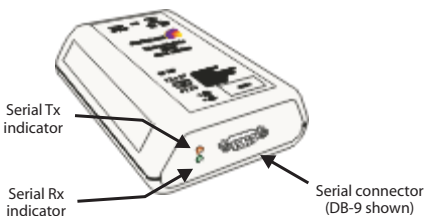
1. Connect the power supply to the NETRS232 and to AC power.
2. The power (red) LED will light to indicate that the unit is receiving power.
3. Connect a network cable to the RJ-45 jack of the NETRS232. The other end of the network cable can be attached to either:
  - an Ethernet hub or switch, using a length of standard Ethernet network cable
  - a host PC directly, using an Ethernet cross-over cable.

Network status is indicated by two LEDs on the RJ-45 connector. The left (yellow) LED indicates network activity. It is on by default, turning off when network activity occurs at the NETRS232. The right (green) LED indicates a network link. It is off by default, but lights when a network link exists.

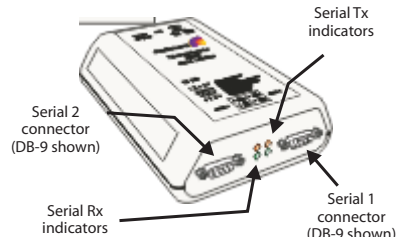


4. Connect a serial device to the NETRS232.

Serial port activity is indicated by two status LEDs per port. The upper (yellow) LED lights when the serial port is transmitting data. The lower (green) LED lights when the serial port is receiving data.



**Single Port**



**Dual Port**

# 3

## Software Installation and Configuration

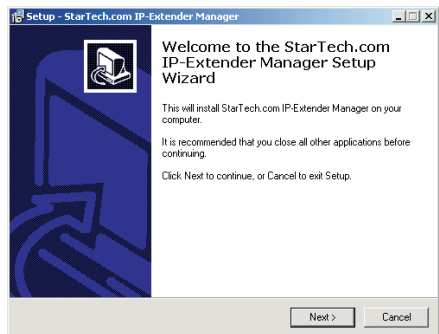
Software installation and configuration consists of the following:

- A. Running the NETRS232 setup software
- B. Configuring network settings
- C. Activating and deactivating NETRS232 ports
- D. Optional advanced port configuration

### A. Running the NETRS232 setup software

The installation diskette has files to install NETRS232 drivers on your PC and to detect NETRS232 devices on your network. To run the installation software, insert the installation diskette and run "Setup.exe". The Setup Wizard will ask you to supply basic installation information.

The Setup Wizard will finish by opening the *IP-Extender Manager*. By default the *IP-Extender Manager* will display NETRS232 devices that it has detected on your network.



### B. Configuring network settings

The *IP-Extender Manager* displays NETRS232 information in a Windows Explorer-like interface. Any NETRS232 devices that are discovered on your network are displayed in the "IP-Extenders Near Me" branch of the "My IP-Extender Network" tree. NETRS232 devices installed on your network will need unique IP addresses. These can be set by using either the *IP-Extender Manager*, a web browser, or a Telnet client.

The factory default network settings for the NETRS232 are:

IP address:	192.168.0.35
Subnet mask:	255.255.255.0
Gateway address:	0.0.0.0
Name:	[empty]
Workgroup:	[empty]
DHCP detection:	disabled

**Before Proceeding:** The NETRS232 is factory preset with an IP address of 192.168.0.35. If this IP address cannot be used on the network (it may already be in use, for instance), do not initially connect the NETRS232 to the network. Instead, either:

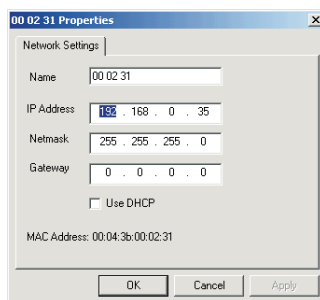
- 1) connect the NETRS232 to a network segment that is not already using the NETRS232 default IP address for another device or,
- 2) connect the NETRS232 directly to a host PC using an Ethernet crossover cable.

Follow the procedure described in the "Configuring network settings" section of this manual to set the IP address to a usable address for the network onto which the NETRS232 will be installed.

### **Configuring NETRS232 network settings using the IP-Extender Manager**

To set a NETRS232's network settings using the *IP-Extender Manager*, right-click on it in the IP-Extender tree and select "Properties". If the NETRS232 is accessible on the network, a dialog will open that allows you to give it a new name, IP address, subnet mask, and gateway address. If your network assigns IP addresses using a DHCP server, DHCP detection can also be enabled.

Changes made using the *IP-Extender Manager* will be updated to both the local PC and to the NETRS232.



**NOTE:** Changing the network settings of a NETRS232 device may make that device unavailable to other stations that have activated a connection to that device using older network settings.

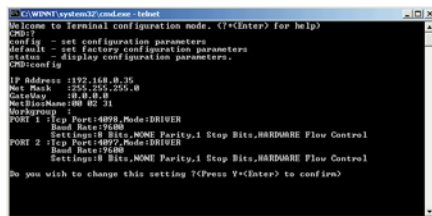
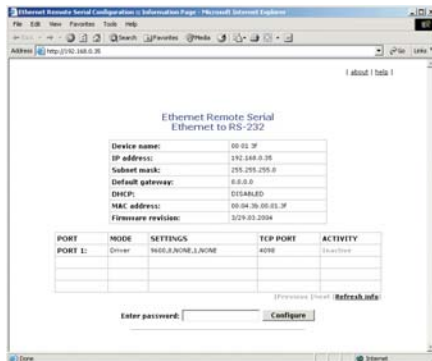
**NOTE:** The *IP-Extender Manager* is the recommended method of changing all NETRS232 settings.

### **Configuring NETRS232 network settings using a web browser**

To set a NETRS232's network settings using a web browser, open the browser and enter the IP address of the NETRS232 into the browser's location bar. The embedded web server running on the NETRS232 will display the opening screen of the NETRS232 configuration menu.

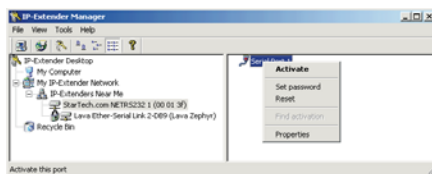
Changes made using a web browser will be updated to the NETRS232 but not to the local PC.

## Configuring NETRS232 network settings using a Telnet client



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Before activation, NETRS232 ports only appear under the "My IP-Extender Network" branch of the IP-Extender Desktop. Once they have been activated for a local system, they will also appear under "My Computer" in the *IP-Extender Manager*.



panel of the *IP-Extender Manager*, and select "Deactivate". To deactivate all ports on a particular NETRS232 device, right click on that device in the left panel of the *Manager* and select "Remove All".

Icons depict the states of NETRS232 devices and ports as follows:



Device available  
on the  
network



Device not  
available on the  
network



Under "My Computer":  
Port available



Under "My Computer":  
Port not available

Under "My Ether Link Network":  
Port activated locally

Under "My Ether Link Network":  
Port not activated locally

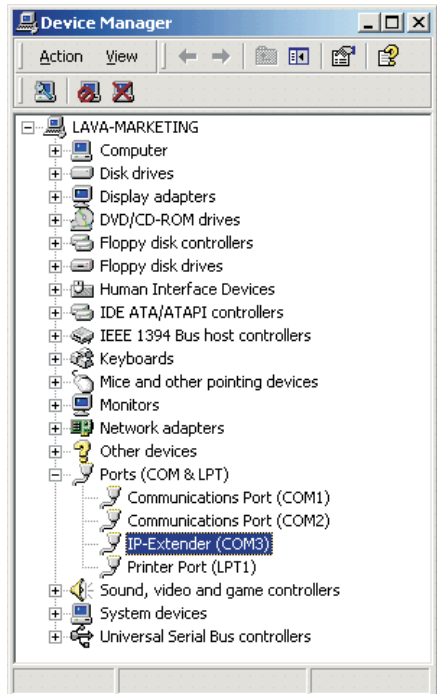
Activated ports appear in Windows' Device Manager under the "Ports (COM & LPT)" branch as "IP-Extender" ports, with their associated COM numbers.

Activating and deactivating NETRS232 ports on one computer does not affect the operation of those ports on other systems.

## **D. Optional advanced port configuration**

NETRS232 ports that have been activated on your PC can generally be used immediately without further configuration. Additional configuration options can however be accessed through the *IP-Extender Manager*. These configuration options are discussed in detail in the "advanced.pdf" readme file on the Installation diskette.

Advanced settings include passwords; port binding options that can associate a port with a specified IP address, NetBios name, or MAC address; port modes for raw server or client connection, Ethernet modem operation, RFC 2217 communications, data connect operation, or RAS server communications; and a COM port number reassignment feature.



## NETRS232 Advanced Features

This document describes the advanced configuration features of the NETRS232. It covers:

1. NETRS232 port modes
2. Virtual port (driver) settings
3. Virtual port (driver) bindings
4. Virtual port COM number assignment

### 1. NETRS232 port modes

The NETRS232 converts serial port data to and from TCP/IP packets over Ethernet. Each NETRS232 port exchanges TCP/IP packets on its own unique TCP port (called the "Local Port" in the Properties dialog box). Each serial port on an NETRS232 device can be configured independently to perform this conversion in one of eight modes:

#### ***Driver Mode (Default mode)***

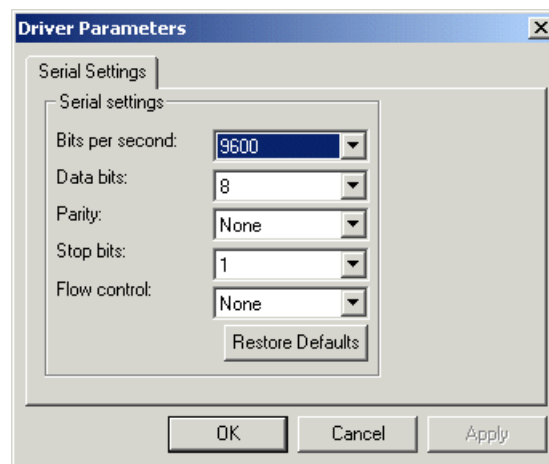
This mode enables the physical port of a NETRS232 to communicate directly with the serial port API of a supported operating system as a local COM port. In this mode, authorized users can set bits per second, data bits, parity, stop bits, and flow control port-by-port, or the port will accept its serial port settings from the application/operating system that is accessing it. Driver mode is the factory default mode when a NETRS232 is installed.

When installed on a LAN, a NETRS232 in Driver Mode has all the functionality of an internally installed serial port.

When installed on a WAN or the Internet, the serial port of a NETRS232 gains enormous flexibility and power. To use a NETRS232 port on a remote network:

1. configure the IP address and TCP port of the WAN connection in the *IP-Extender Manager* to match the gateway IP address of the remote network,
2. map the IP address and TCP port of the remote gateway to the IP address of the NETRS232, and
3. configure the NETRS232 itself for Driver Mode.

**Applications:** General serial port access from applications running on a PC.



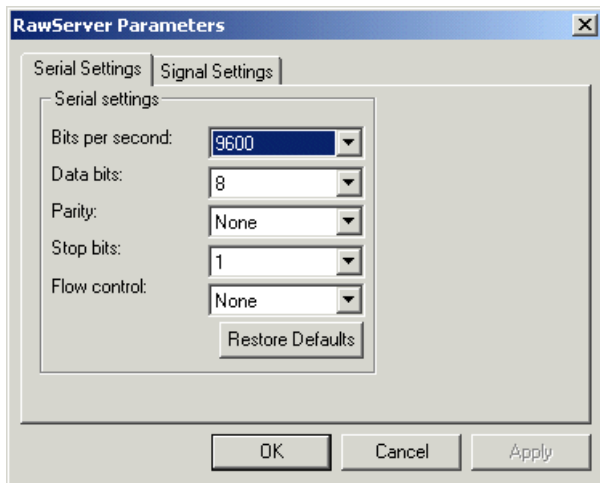


### Raw Server Mode

This mode is used to establish a raw TCP connection to a NETRS232 port. The physical port on the NETRS232 is made available as a network resource with a specified IP address and port number. In this mode, authorized users can set bits per second, data bits, parity, stop bits, and flow control port-by-port, to match the requirements of the Data Terminal Equipment (DTE) connected to the physical NETRS232 port.

Control lines can be triggered by the TCP connection being established. Under the "Signal Settings" tab shown below, the user can set how the control lines are to react when a TCP connection is established.

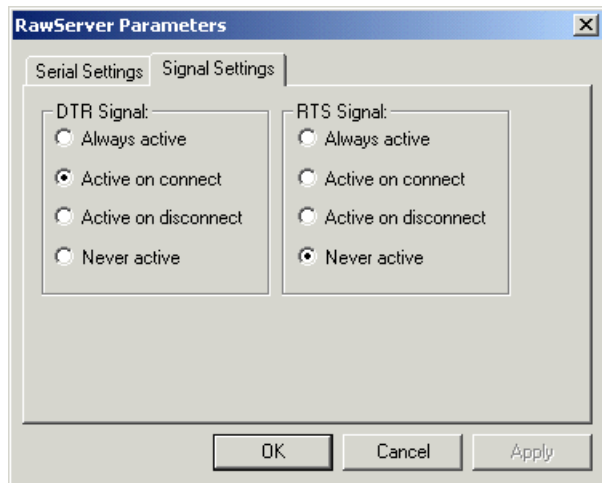
*Applications:* Remote monitoring, security systems.



The "RawServer Parameters" dialog box is shown with the "Serial Settings" tab selected. It contains the following settings:

- Bits per second: 9600
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: None

A "Restore Defaults" button is located below the flow control setting. At the bottom of the dialog are "OK", "Cancel", and "Apply" buttons.



The "RawServer Parameters" dialog box is shown with the "Signal Settings" tab selected. It contains two sections:

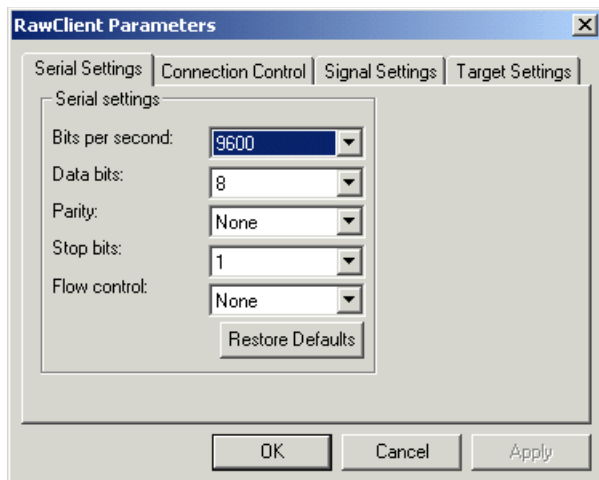
- DTR Signal:**
  - ☐ Always active
  - ☒ Active on connect
  - ☐ Active on disconnect
  - ☐ Never active
- RTS Signal:**
  - ☐ Always active
  - ☐ Active on connect
  - ☐ Active on disconnect
  - ☒ Never active

At the bottom of the dialog are "OK", "Cancel", and "Apply" buttons.

### Raw Client Mode

This mode is used to establish a raw connection to the NETRS232. The physical port on the NETRS232 is configured to initiate a connection to a pre-defined IP address and port number, specified by an authorized user of that port in the "Target Settings" dialog box. In this mode, authorized users set bits per second, data bits, parity, stop bits, and flow control port-by-port, to match the requirements of the Data Terminal Equipment (DTE) connected to the physical NETRS232 port. Operating as a client, the NETRS232 will open a connection to the target IP address and port when it detects one or more of the following line conditions: data, DSR, CTS, RI, or CD. Users can configure which of these triggers will be in effect for any NETRS232 port set in this mode in the "Connection Control" dialog box. "Signal Settings" are also settable by the user, as described in Raw Server mode.

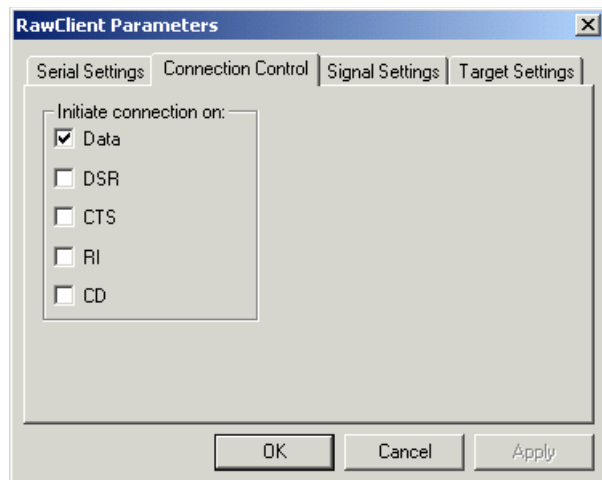
*Application:* Remote control.



The "RawClient Parameters" dialog box is shown with the "Serial Settings" tab selected. It contains the following settings:

- Bits per second: 9600
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: None

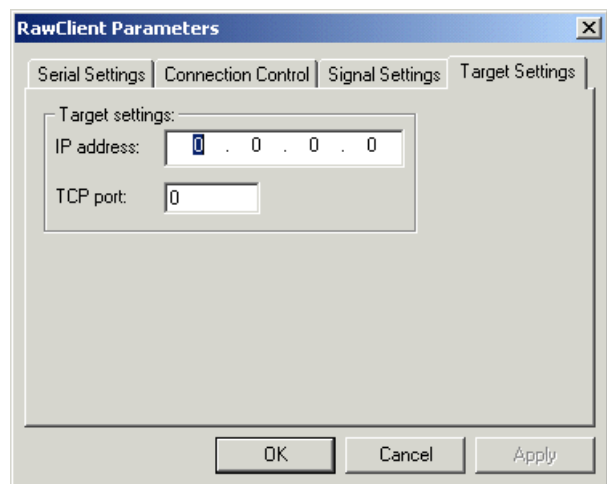
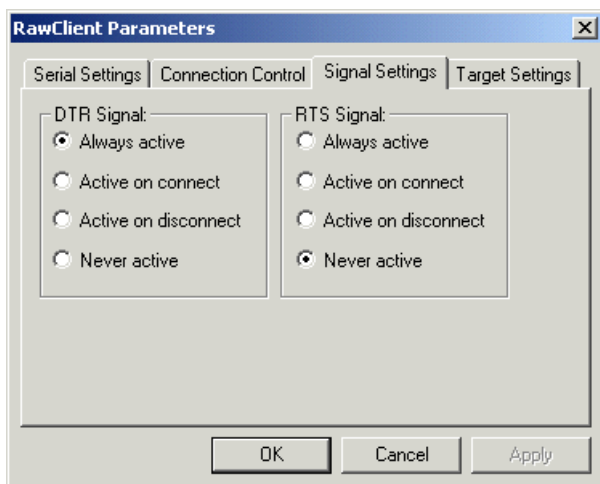
A "Restore Defaults" button is located below the flow control setting. At the bottom of the dialog are "OK", "Cancel", and "Apply" buttons.



The "RawClient Parameters" dialog box is shown with the "Connection Control" tab selected. It contains the following settings:

- Initiate connection on:
  - ☒ Data
  - ☐ DSR
  - ☐ CTS
  - ☐ RI
  - ☐ CD

At the bottom of the dialog are "OK", "Cancel", and "Apply" buttons.

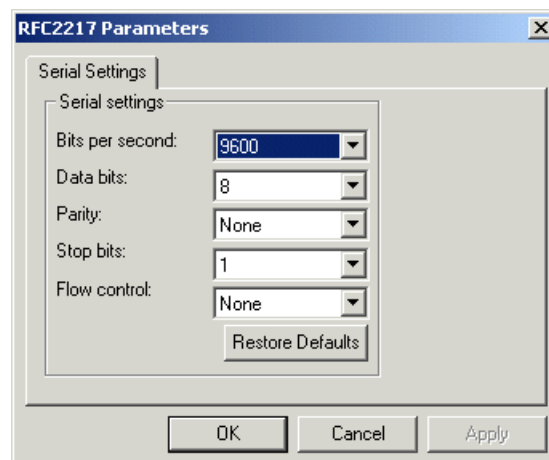


### **RFC2217 Mode**

Users who want to communicate with a NETRS232 across gateways or routers can configure a port on a NETRS232 to operate in RFC 2217 mode, allowing serial port configuration commands and serial data to be sent to a NETRS232 using the RFC 2217 framework for serial port control over Telnet. For those not familiar with RFC 2217 (the Telnet COM Port Control Option), the text of the actual RFC (Request For Comments) is available at [www.faqs.org/rfcs/rfc2217.html](http://www.faqs.org/rfcs/rfc2217.html) or at any number of other sites.

This mode opens a NETRS232 port when a TCP connection is established to the "local port". Port settings are embedded in data stream in accordance with RFC 2217.

*Applications:* UNIX systems and other platforms that have RFC 2217 Telnet capability can access and control the serial COM port of the NETRS232.



### **Data Connect Mode**

Data Connect mode combines Raw Client mode and Raw Server Mode. In this mode, the NETRS232 will either initiate a TCP connection when activity is detected at the serial port, or it will receive TCP packetized serial data from the network port when an outside client connects to it.

The configuration parameters for this mode combine all the parameters found in Raw Client and Raw Server modes (see above for details).

With two NETRS232s in this mode placed "back to back," the connection between them becomes in effect a cable extender over an Ethernet connection.

*Applications:* Data connect mode provides a serial-to-serial communication link that would not be practicable to implement as a directly-wired link; it can replace serial cables with an Ethernet connection.

**DataConnect Parameters**

Serial Settings | Connection Control | Signal Settings | Target Settings

Serial settings

Bits per second: 9600

Data bits: 8

Parity: None

Stop bits: 1

Flow control: None

Restore Defaults

OK Cancel Apply

**DataConnect Parameters**

Serial Settings | Connection Control | Signal Settings | Target Settings

Initiate connection on:

☒ Data

☐ DSR

☐ CTS

☐ RI

☐ CD

OK Cancel Apply

**DataConnect Parameters**

Serial Settings | Connection Control | Signal Settings | Target Settings

DTR Signal:

☒ Always active

☐ Active on connect

☐ Active on disconnect

☐ Never active

RTS Signal:

☐ Always active

☐ Active on connect

☐ Active on disconnect

☒ Never active

OK Cancel Apply

**DataConnect Parameters**

Serial Settings | Connection Control | Signal Settings | Target Settings

Target settings:

IP address: 0 . 0 . 0 . 0

TCP port: 0

OK Cancel Apply

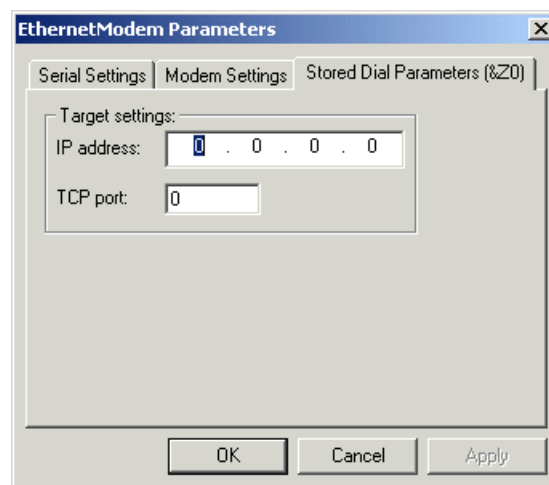
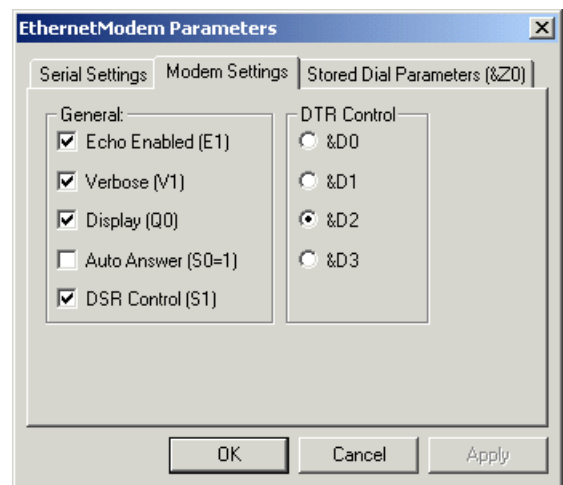
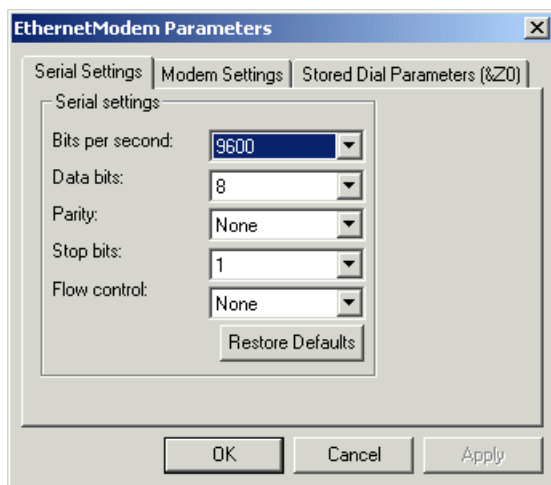
### **Ethernet Modem Mode**

This mode allows Data Terminal Equipment (DTE) to control the NETRS232 using the conventional modem "AT" command set. In this mode, a DTE user is able to "dial" an IP address and TCP port. Incoming TCP connections are handled under AT command set rules.

The standard serial port settings for bits per second, data bits, parity, stop bits, and flow control are available for configuration, and should be set to match the DTE.

Modem settings include ECHO Enabled (E1), Result Codes Format Verbose (V1), Result Codes Display Return (Q0), Auto answer (S0=1), DSR Control (&S1). Modem DTR control can be set to &D0, &D1, &D2, or &D3.

*Applications:* To provide the standard "AT" command interface to user applications that wish to communicate with devices in an Ethernet environment. Remote console management that looks for AT interfacing can use this application.



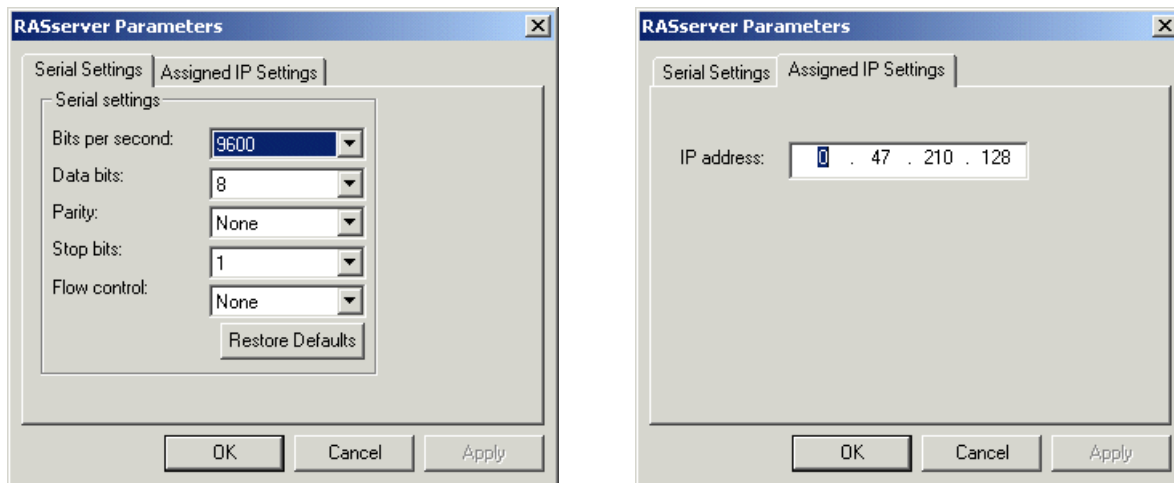
### ***RAS Server Mode***

Windows-based devices that have Remote Access Services (RAS) client capability but are not equipped with a direct network interface can access the network through a serial port using the Point-to-Point Protocol (PPP).

The serial port of the RAS client device is attached to the serial port of the NETRS232, configured in RAS Server mode. The RAS negotiations are conducted between the RAS client and the NETRS232 RAS server.

In the initial negotiations between the RAS client and the NETRS232, an IP address (configured by user) is assigned to RAS client, which is used for all Ethernet communications related to the RAS client.

*Applications:* Windows CE embedded systems, Palm type units, or other portable data acquisition devices that may need access to a TCP/IP-Ethernet environment, and have PPP capability, but do not have a Ethernet port, can be connected to the serial port of a NETRS232.

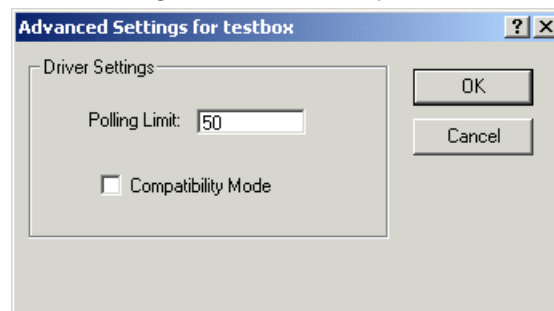


### **Disabled Mode**

This mode simply disables a port; it has no configuration settings.

## **2. Virtual port (driver) settings**

The NETRS232 virtual port allows a serial port on a NETRS232 to be used in same manner as a local serial port when the port is configured in Driver Mode (described above). In this state, the driver for the virtual port converts local serial port accesses into TCP/IP packets to be exchanged with NETRS232 ports.



### **Polling Limit**

Setting a polling limit for the virtual port driver allows the NETRS232 to support high-speed connections. The serial port is constantly polled for new data. Polling stops when number of consecutive polls with no new data reaches the polling limit parameter specified in the dialog box. Since polling introduces network traffic, this parameter should be set as low as possible without introducing a lag to the connection. To reduce network traffic, reduce the polling limit; to reduce lag, increase the polling limit. Interactive applications (such as typing) or applications that exchange bursts of data should use a lower polling limit. Applications with a constant high data rate should use a higher polling limit.

### **Compatibility Mode**

The NETRS232 virtual port normally operates in high performance mode. Compatibility mode supports applications that require a more accurate simulation of a local serial port. The need for Compatibility mode is indicated when data being sent to the remote serial port is lost or sent repeatedly.

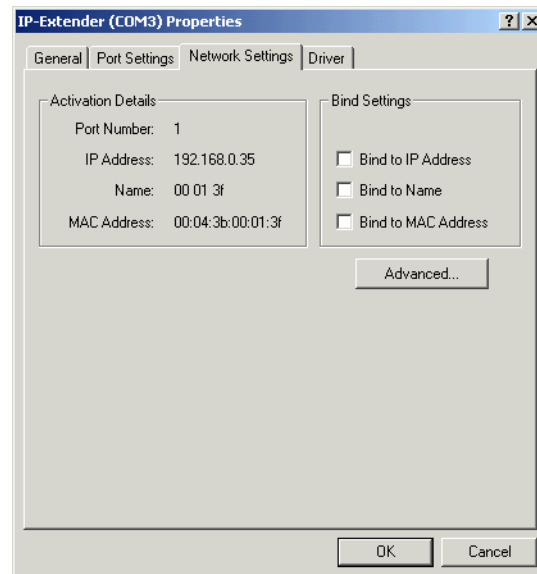
## **3. Virtual port (driver) bindings**

### **Background**

Activating a NETRS232 port in effect creates a "virtual" driver port that is associated with a particular physical serial port on a particular NETRS232. When a driver virtual port is opened, a connection must be established to the appropriate NETRS232. In normal operation, that connection is made to the IP address assigned to the NETRS232 at the time the activation was created. However, on many Ethernet/IP networks, the IP address of individual devices may change

(for example, when a DHCP server assigns addresses). This address reassignment will cause virtual ports to fail or make unintended connections to unintended NETRS232s.

Therefore, NETRS232s are designed with the ability to "find" a NETRS232 port based on a "binding". A port binding is a network identification of the target NETRS232 that must match before a driver port will initiate a connection. Bindings may be made to the MAC address, Name, or IP address of the associated device.



### ***Binding to MAC Address***

MAC addresses are unique and permanent identifiers for Ethernet devices, and are assigned to devices when they are manufactured. Binding to a NETRS232's MAC address ensures that a virtual port always makes a connection to that same physical device, even if the device's IP address or Name have changed. Binding to MAC address provides security and reliability. Virtual ports will only connect to that single particular physical device.

### ***Binding to Name***

Device Name is a 15-character field assigned by the NETRS232 system administrator. Binding a virtual port to a device's Name will ensure that a connection will be made to an actual port if a device can be found with the name specified in the "Bindings" dialog box. This port may be on a different physical device from the one with which the virtual port was initially communicating (that is, a device with a different MAC address), or it may be a port on the same physical device but with a changed IP address, or both. Binding to a device's Name provides reliability and dynamic connections. Virtual ports will connect to the device with a name that matches the binding. If a particular device is replaced with a new one with the same assigned Name, the virtual port will establish the connection. Also, Names can be reassigned at any time to cause client PCs to connect to new devices without being reconfigured.

Binding a virtual port to a Name allows that virtual port to be identified on the network with a more representative mnemonic than an IP address or MAC address. For example, a security system might name its virtual port targets "Camera1", "Camera2", "CardReader6", and so forth.

### ***Binding to IP Address***

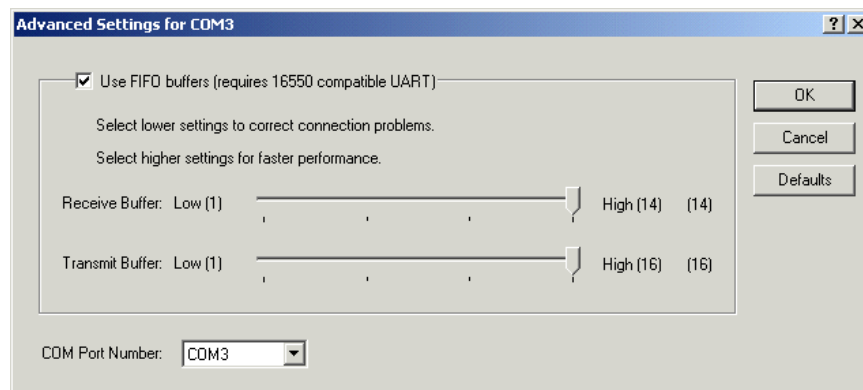
The IP address of a network device is assigned by either the NETRS232 system administrator or through a DHCP server. Binding a virtual port to an IP address will force that virtual port to attempt a connection to any device with that particular IP address only. Binding to IP address provides dynamic connections. Device IP addresses can be reassigned at any time to cause client PCs to form new connections without being reconfigured. Note: when no bindings have been stipulated, a virtual port is implicitly bound to an IP address because such an address is required to make a connection.

### ***Binding to more than one parameter***

Usually, only one degree of binding is sufficient for an individual virtual port to achieve the goals of robust communication and flexibility. It is however also possible to bind a virtual port to more than one parameter. Doing so requires careful consideration of the implications of maintaining connectivity. If multiple bindings are selected for one port, all individual binding parameters must match for a connection to be made. For example, enabling both IP address and MAC address bindings for a virtual port would cause that virtual port to find a particular physical device by MAC address, but make a connection only if the device's IP address also matched the binding setting.

#### 4. Virtual port COM number assignment

By default, an NETRS232 virtual serial port is assigned to the next available COM number when it is activated. This COM number assignment can be reassigned to any unused COM number from 1 to 256.



## Technical Support

The following technical resources are available for this StarTech.com product:

On-line help:

We are constantly adding new information to the *Tech Support* section of our web site. To access this page, click the *Tech Support* link on our homepage, **[www.startech.com](http://www.startech.com)**. In the tech support section there are a number of options that can provide assistance with this product.

Knowledge Base - This tool allows you to search for answers to common issues using key words that describe the product and your issue.

FAQ - This tool provides quick answers to the top questions asked by our customers.

Downloads - This selection takes you to our driver download page where you can find the latest drivers for this product.

Call StarTech.com tech support for help:

**USA/Canada:** 1-800-265-1844

**UK/Ireland/Europe:** 00-800-7827-8324

*Support hours: Monday to Friday 8:30AM to 6:00PM EST (except holidays)*

## Warranty Information

This product is backed by a one-year warranty. In addition, StarTech.com warrants its products against defects in materials and workmanship for the periods noted, following the initial date of purchase. During this period, the products may be returned for repair, or replacement with equivalent products at our discretion. The warranty covers parts and labor costs only. StarTech.com does not warrant its products from defects or damages arising from misuse, abuse, alteration, or normal wear and tear.

### Limitation of Liability

In no event shall the liability of StarTech.com Ltd. and StarTech.com USA LLP (or their officers, directors, employees or agents) for any damages (whether direct or indirect, special, punitive, incidental, consequential, or otherwise), loss of profits, loss of business, or any pecuniary loss, arising out of or related to the use of the product exceed the actual price paid for the product.

Some states do not allow the exclusion or limitation of incidental or consequential damages. If such laws apply, the limitations or exclusions contained in this statement may not apply to you.